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Table Of Content

160. Phenotyping asthma with biomarkers

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Breathomics can discriminate between anti IgE-treated and non-treated severe asthma adults

Giuseppe Santini[1], Stefano Di Carlo[2], Alfredo Benso[2], Nadia Mores[1], Paul Brinkman[3], Salvatore Valente[4], Paolo Montuschi[2], Francesco Macagno[4], Gianfranco Politano[2], Ariane H. Wagener[3], Aruna T. Bansal[5], Hugo H. Knobel[6], Anton J. Vink[6], Nicholas Rattray[7], Marco Santonico[8], Giorgio Pennazza[8], Yuanyue Wang[6], Ildiko Horvath[9], Ratko Djukanovic[10], Riccardo Polosa[11], Stephen J. Fowler[7], Pascal Chanez[12], Kian F. Chung[13], Peter J. Sterk[3], Paolo Montuschi[1], U-BIOPRED Study Group

[1]Pharmacology, Catholic University of the Sacred Heart, Rome, Italy; [2]Computer Engineering, Polytechnic of Turin, Turin, Italy; [3]Respiratory Medicine, Academic Medical Centre, University of Amsterdam, Amsterdam, Netherlands; [4]Internal Medicine and Geriatrics, Catholic University of the Sacred Heart, Rome, Italy; [5]Biostatistics, Acclarogen Ltd., Cambridge, United Kingdom; [6]Physical Chemistry, Philips Research Laboratories, Eindhoven, Netherlands; [7]Respiratory Medicine, University of Manchester, Manchester, United Kingdom; [8]Electronic Engineering, Università Campus Bio-Medico, Rome, Italy; [9]Respiratory Medicine, Semmelweis University, Budapest, Hungary; [10]Respiratory Medicine, University of Southampton, Southampton, United Kingdom; [11]Internal Medicine, University of Catania, Catania, Italy; [12]Respiratory Medicine, University of Marseille, Marseille, France; [13]Respiratory Medicine, Imperial College, London, United Kingdom

Rationale: Omalizumab, an anti-IgE monoclonal antibody, is indicated in adults with severe persistent allergic asthma. Exhaled molecular markers can provide phenotypic information in asthma. **Objectives:** Determine whether adults with severe asthma on omalizumab (anti-IgE$^+$) have a different breathprint compared with those who were not on anti-IgE therapy (anti-IgE$^-$) as assessed by eNoses and gas chromatography/mass spectrometry (GC/MS) (breathomics). **Methods:** This was a cross-sectional analysis of the U-BIOPRED adult cohort. Severe asthma was defined by IMI-criteria [Bel, Thorax 2011]. Anti-IgE$^+$ patients were on a regular treatment with s.c. omalizumab (150-375 mg) every 2-4 weeks. Exhaled volatile compounds trapped on adsorption tubes were analysed by a centralized eNose platform (Owlstone Lonestar, two Cyranose 320, Comon Invent, Tor Vergata TEN), including a total of 190 sensors, and GC/MS. Recursive feature elimination (http://topepo.github.io/caret/rfe.html) was used for feature selection and random forests, more robust to overfitting, for classification. **Results:** 9 anti-IgE$^+$ (females/males 2/7, age 52.6±16.3 years, mean±SD, 1/2/6 current/ex/nonsmokers, pre-bronchodilator FEV_1 70.6±21.1% predicted value) and 30 anti-IgE$^-$ patients (18/12 females/males, age 53.2±14.2 years, 0/16/14 current/ex/nonsmokers, pre-bronchodilator FEV_1 59.6±30.7% predicted value) were studied. Accuracy of classification is shown in Table 1.

Table 1

eNose/Technique	Variables	Accuracy
TOR	4	0.87
LONE	71	0.83
CYRA2	12	0.82
CI	2	0.87
CYRA1	14	0.75
All eNoses	110	0.85
GC/MS	96	0.83
eNoses+GC/MS	16	0.83

Conclusions: Preliminary results suggest that breathomics can distinguish between anti-IgE$^+$ and anti-IgE$^-$ severe asthma patients.